



1-D Dam-Break Modeling: Case Study of Successive Dam-Break

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Unexpected disastrous floods or flash floods caused by climate change are becoming more frequent. Therefore, there is a possibility of dam failure due to natural disasters including heavy rainfall, landslide and earthquakes, and an unexpected emergencies may be caused by the defect of dams or appurtenant structures due to the aging of the dam. It is desirable to prevent in advance because emergencies such as dam failure can cause many casualties and property damage.

Dam failure rapidly propagates enormous flow to the downstream, so the evacuation time is short and causes many casualties compared to other types of floods. In order to minimize casualties from dam failure, it is important to establish emergency action plan, flood hazard map and advance warning system. For the establishment of these three, accurate dam failure modeling is required. Most of the studies on dam failure modeling have been conducted for single dam failure rather than successive failure of two or more dams. This study conducted a successive failure modeling of Janghyun Dam and Dongmak Dam in Korea, which collapsed due to Typhoon Rusa in 2002.

The DAMBRK (Dam-Break Flood Forecasting Model) has been applied to the successive failure modeling of two dams which are located in parallel. The relaxation scheme was added to DAMBRK to consider the tributary cross-section. In addition, this study proposed a method to estimate the dam failure duration using empirical formulas for the peak discharge of dam failure and failure formation time of ASDSO (Association of State Dam Safety Officials). The failure hydrograph of two dams was estimated using the proposed method and the discharge and water surface elevation were predicted at the main locations of downstream according to the propagation of dam failure discharge. The accuracy and applicability of the modeling were validated by comparing the predicted water surface elevations with field surveyed data and showing good agreements between predictions and measurements.

Keywords: Successive Dam-Break, Flooding, DAMBRK

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